B.TECH

Regular Theory Examination(Odd Sem-VII), 2016-17

DATA COMMUNICATION NETWORKS

Time : 3 Hours   *Max. Marks : 100*

Note :   Attempt all Sections. If require any missing data; then choose suitably.

SECTION - A

1.   **Attempt all question in brief.**   **(10×2=20)**

   a.   What do you mean by transmission system utilization?

   b.   In which layer and why error detection and correction are required?

   c.   An ALOHA network uses 19.2 Kbps channel for sending message packets of 100 bit long size. Calculate the maximum through put for pure ALOHA network.

   d.   What is Hamming code?

   e.   What is gigabit Ethernet?

   f.   Write the advantage of carrier sense multiple access protocol.

g. What is limited - contention protocol?

h. Explain wavelength division multiple access protocol.

i. What is meaning of 100 BASE-T. Explain each term.

j. A channel has a bit rate 4kbps and propagation delay of 20 msec. What will be the size of frame range stop and wait give an 50 percent.

SECTION - B

2. **Attempt any three of the following :** **(3×10=30)**

a. Draw the block diagram of a communication model. Explain each bock in detail.

b. What is modulation? Why modulation is needed? Differentiate between Amplitude modulation, frequency modulation and phase modulation.

c. Consider an irregular LDPC code with $\lambda(x) = 0.3x^2 + 0.1x^3 + 0.6x^4$ and p(x) ax^7+bx^8 (i) Find a and b such that the code has rate 1/2. Use these values for the remaining parts of the problem. (ii) What fraction of the variable nodes has degree 4? (iii) What fraction of the check nodes have degree 9? (iv) Find the E_b/N_0 threshold for belief propagation over an AWGN channel using the Gaussian approximation.

d. What is HDLC? Discuss various type of configuration model in HDLC used by station.

e. Explain static channel allocation and dynamic channel allocation in detail.

SECTION - C

3. **Attempt any one of the following :**   (1×10=10)

a. What is multiple access technique? Explain FDMA and TDMA access technique in detail.

b. Prove that link budget equation

$P_{RXdBm} + G_{TXdB} + G_{RXdB} - L_{pathdB}(R)$ where $L_{pathdB}(R)$ is path loss.

4. **Attempt any one of the following :**   (1×10=10)

a. What is noise? What are various form and source of noise? Discuss the various form and source of nosie? Discuss the importance of S/N ratio in radio receiver.

b. Explain with proper figure deterministic and stochastic signal. Where and how signal is more affected from noise?

5. **Attempt any one of the following:**   (1×10=10)

a. Explain orthogonal frequency division multiplexing. Draw and explain the block diagram of OFDM transmitter and receiver. Where OFDM is used?

b. Explain the CRC error detection technique generator polynomial $x^4 + x^3 + 1$ and data is 11100011.

6. **Attempt any one of the following :**   (1×10=10)

    a. Explain working of point to point protocol. Discuss frame format for point to point protocol.

    b. An AWGN channel of bandwidth 3MHz are given. Assume that implementation constraints dictate an excess bandwidth of 50%. Find the achievable bit rate, the E_b/N_o required for a BER of 10^{-8} and the receiver sensitivity (assuming a receiver noise figure of 7dB) for the following modulation scheme assuming that the bit-to symbol map is optimized to minimize the BER whenever possible (i) QPSK (ii) 8-PSK.

7. **Attempt any one of the following :**   (1×10=10)

    a. How do we say collision detection is analog process? Why do we prefer CSMA over ALOHA? Prove that maximum efficiency of ALOHA IS 1/e.

    b. Prove that the throughput of network using slotted ALOHA can be given as $S=Ge^G$ where G is the load and S is throughput.

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